SPECIFIED GAS EMITTERS REGULATION

OFFSET CREDIT PROJECT GUIDANCE DOCUMENT

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Alberta ENVIRONMENT

ALBERTANS & CLIMATE CHANGE

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1.0 INTRODUCTION

The Alberta Government recognizes that global climate change is real, and is committed to taking effective action on climate change[1]. The development of a carbon compliance system, allowing emission offsets as a compliance option, was one of several actions outlined by the Alberta Government in Albertans and Climate Change: *Taking Action* (October 2002) and in the *Climate Change and Emissions Management Act* (2007). In order to be effective, the compliance-based carbon market must both reflect Alberta's environmental and economic circumstances, and demonstrate consistency in approach with national efforts to reduce climate change.

Alberta's regulatory system for managing Greenhouse Gases[2] effective July 1, 2007 enables a compliance-based carbon market[3] to develop in this province by:

- Establishing market demand through regulated emission reduction targets for large emitters; and
- Enabling market supply through allowing emission offsets as a compliance option for regulated emitters.

Regulated firms can buy verified emission reductions and/or removals of greenhouse gases (i.e. offsets) from voluntary actions arising from unregulated activities (i.e. offset projects) in Alberta.

This market-based approach to managing carbon has been widely supported by governments and stakeholders as a more cost-effective way to achieve climate change objectives[4]. It offers flexibility for emitters, since markets typically determine the most cost-effective emission reduction opportunities. Further, ability to sell offsets provides an incentive for Albertans, from all sectors of the economy, to innovate and invest in activities that will reduce greenhouse gas emissions beyond regulated activities.

1.1 Purpose of the Project Guidance Document

The Alberta government recognizes that this kind of approach is new; therefore, a series of Guidance Documents have been prepared to provide market participants more certainty about where investments can be made in the Alberta Offset Market. This *Project Guidance Document* is one of a series of guidance documents prepared for the Regulatory Framework. The purpose of this Guide is to outline the process and requirements for undertaking Offset Projects in Alberta.

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[1] See Intergovernmental Panel on Climate Change 4th Assessment Summaries 2007 – www.ipcc.ch

[2] *Specified Gas Emitters Regulation*, under the government's *Climate Change and Emissions Management Act*

[3] Offset - a reduction or removal in GHG emissions from a project that features a new management practice, technology and/or control system. Other terms include 'offset credit', 'carbon credit' and 'credit' which, for the purposes of this guidance document are considered synonymous and are used interchangeably throughout this document.

[4] E.g. Emissions trading is the central mechanism used by European countries to meet their international commitments. International markets for carbon are also growing at exponential rates, driving innovation and sustainable development.

It is highly recommended that this document be reviewed along with the *Verification Guidance Document* in this series.

2.0 PROJECT GUIDANCE

2.1 Background

2.1.1 Context

Market-based approaches, like that of the Alberta Offset System, are an alternative to traditional command and control measures to reducing pollution. Although it complements a regulatory measure (regulated targets), it allows for the flexibility and innovation of the private market to find reduction opportunities, resulting in cost-effective strategies to reduce greenhouse gases (GHGs). This approach has been used successfully in other environmental areas, such as sulphur dioxide, fisheries, renewable energy and lead in gasoline. The use of offsets in an emissions reduction framework has commonly been referred to as 'Carbon Credit Trading'.

Experience in Canada around carbon credit trading or emission offsets is limited. Pilot programs such as GERT[5], PERT[6] and PERRL[7], as well as sales of emission reductions to companies that have set voluntary emission targets (such as those under the Chicago Climate Exchange) have occurred, but trading has been limited, and only a small number of transactions have taken place.

Alberta's Offset System is intended to bring forward 'project-based' GHG reductions and removals from actions that are beyond business as usual, including those that are not driven by Alberta regulations. Emission reductions could come from projects that reduce emissions at a source (e.g. manure management directly, or indirectly through clean energy projects that displace fossil fuel based energy), or by removing GHG emissions from the atmosphere, through projects that store carbon through biological sequestration (agriculture soils and treed areas) or geological sequestration such as enhanced oil recovery and acid gas re-injection projects.

In general, an emission offset is generated when a project results in GHG reductions or removals that go beyond normal business operations, or common industry practice (i.e. 'business as usual'), and results in lower emissions that would be the case if offset credits were not available[8]. The next section will define the criteria necessary for generating offsets in the Alberta system.

2.1.2 Project Eligibility Criteria

The Alberta regulations define the necessary eligibility criteria for generating and using emission offsets for compliance in Alberta. In order to qualify, project-based emission reductions or removals must:

[5] Greenhouse Gas Emission Reduction (GERT) pilot – cross-Canada government-industry-NGO initiative that tested approaches to GHG credit trading.
[6] Pilot Emission Reduction Trading (PERT) pilot – Ontario initiative that piloted emissions trading for local and regional air pollutants as well as GHGs.
[7] Pilot Emission Removals, Reductions and Learnings (PERRL) – a federal initiative that purchased and retired GHG reductions and removals from qualified projects on a fixed per tonne basis, through a competitive reverse auction.
[8] This is a foundational element of any offset system however application will be evolutionary

- Result from actions taken on or after January 1, 2002;
- Occur on or after January 1, 2002;
- Be real, demonstrable, quantifiable;
- Not be required by law;
- Have clearly established ownership;
- Be counted once for compliance purposes.
- Be verified by a qualified third party; and,
- Have occurred in Alberta.

Start Date:
Based on the Alberta regulations referenced above, the Project Start Date for the purposes of the Alberta Offset System is set at January 1, 2002. The Project Start Date may be challenging to define for different emission reduction projects because of the broad meaning of the word "action".

To provide some clarity for project developers, the intent of the regulation was to ensure that the projects generating emission reductions are additional to what otherwise would have occurred in Alberta, prior to the January 2002 release Alberta's first climate change plan – *'Taking Action'* – was introduced. It is suggested that project developers consider their Project Start Date to be the first day of operation of the facility or project. For example, the Project Start Date for a landfill gas facility would be the first day of system operation, or the first day where landfill gas was combusted. Specific clarifications for the Project Start Date for different types of projects are listed in Section 2.7. – Special Considerations.

Credit Duration Period:
Projects under the Alberta Offset System will have a credit duration period of 8 years, with a possible extension of an additional 5 years. The intent is to provide a stable baseline for a set period of time, so that investments and commercial models can be implemented with a fair degree of certainty. Facilities that continue to perform above business as usual practices of the day will be eligible for a 5 year extension. Electricity generation facilities will base their performance compared with the electricity displacement factor. For more information on the electricity displacement factor for Alberta-based projects, see Section 2.7 – Special Considerations. Additional information on the credit duration period including exceptions for specific project types is also outlined in Section 2.7.

Real, Demonstrable and Quantifiable:
In order to be 'real', an offset project must have specific and identifiable actions that reduce or remove GHGs. The project cannot simply result in emissions moving to another part of the facility or operation. The project must also demonstrate that it causes a net reduction of all greenhouse gases[9] involved in the project.

To be demonstrable and quantifiable, GHG reductions/removals must be calculated or measured according to scientifically acceptable methods. Records and monitoring information must be maintained in a data management system that documents activities. The more accurate and

[9] As outlined in the *Specified Gas Emitters Regulation*.

reliable the data management system is for a project, the more efficient the third party verification process.

To assist project developers in meeting these criteria, the Government of Alberta has produced a number of Quantification protocols that provide calculations and formulae to reliably quantify the reductions, using best available science.

Not Required by Law:
Under the proposed offset program, reductions or removals must be incremental to provincial regulations. Activities that are already covered under the Specified Gas Emitters Regulation, or that are associated with action to meet requirements under other Alberta's regulatory statutes will not be eligible for emission offsets[10].

Ownership:
There must be clear, legal claim of the greenhouse gas reductions or removals achieved from a project. Several ownership questions can arise, for example:

- Projects on crown land;
- Projects implemented by the land lessee and not the land owner;
- Projects where a technology service provider is installing a unit that results in emission reductions;
- Multiple entities involved in the utilization of displaced heat, power or natural gas or fuels. This is particularly the case in energy efficiency, biofuels and renewable energy projects where the implementer may not be the same as the downstream user.

All of these must be clearly sorted out before undertaking a project. Legal ownership of the GHG reductions and removals must be established by contract or other legal agreement in order to qualify under the Alberta system. The verifier will be specifically looking for evidence that the project developer owns the stated portion, or whole of the emission reduction claim.

Counted Once:
An emission reduction or removal can only be used once to create an emission offset in Alberta's Offset System. Alberta Environment tracks all verified emission offsets from projects that are used for compliance and will randomly audit submitted verification and compliance reports to ensure that activities are unique in the Alberta system. A public Offset Registry will further support the objectives of this criterion.

Verified by a Third Party:
An independent verifier must be able to verify the reductions/removals that are being claimed. Good records of project activities and events are essential to the verification process. These allow the verifier to confirm that the project was conducted according to the project plan or protocol. These data requirements are outlined in the quantification protocols. More guidance on this subject is offered in the *Guide to Verification* in this series.

[10] Note – in the case of activities that have been incented under provincial or federal programs, incrementality will be assessed through the setting of offset project baseline activities within a government approved protocol or on a project methodology basis.

For those familiar with Financial and ISO-14064 principles, the criteria above relate well to these other processes (see Figure 1). Auditors and verifiers use similar, related principles when preparing a financial and ISO audit.

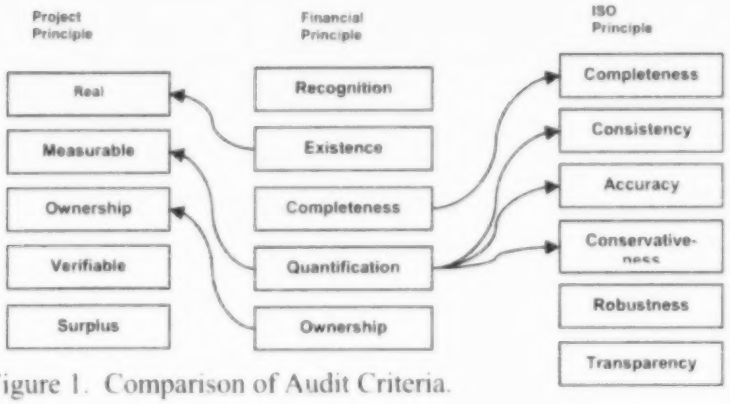


Figure 1. Comparison of Audit Criteria.

2.2 System Design and Requirements

The offset system is designed to encourage cost-effective reductions and removals of GHG activities outside those required by law. Key principles should guide the development, implementation and delivery of an effective and efficient offset system that supports, with integrity, the achievement of associated environmental outcomes.

Consideration and application of these Key Principles must recognize that:

- While each specific principle is important as a stand-alone item, they must be considered in the context of one another as an integrated package of ideas and concepts serving to mutually support each other.
- They reflect the desired attributes of a system that is fully functional and in operation. Initial implementation must reflect the spirit of these Key Principles, but include appropriate flexibility upfront to initiate a system that recognizes and integrates, as appropriate, with other existing or planned climate change policies in Canada.

The Alberta Offset System design centres around 6 Key Principles:

- **Administratively Simple**: the Offset System, including design, implementation and key functions, should be administered in a simple, cost-effective and timely manner;
- **Maximum Scope:** the Offset System should, over time and to the extent practical, promote and enable projects in all sectors and of all types and size;
- **Building and Linking:** the Offset System should seek to maximize efficiency and resources by building on and linking with existing programs and trading systems;
- **Transformational Change**: the design should support transformational change across all sectors of the economy and society in such a way that emission reductions and removals are a part of daily decision-making by Albertans. This change will be enabled, in part, by

the deployment of proven, enhanced and innovative technologies with support from public education, regulatory and other policy direction to drive the behaviours necessary to contribute to overall reductions.

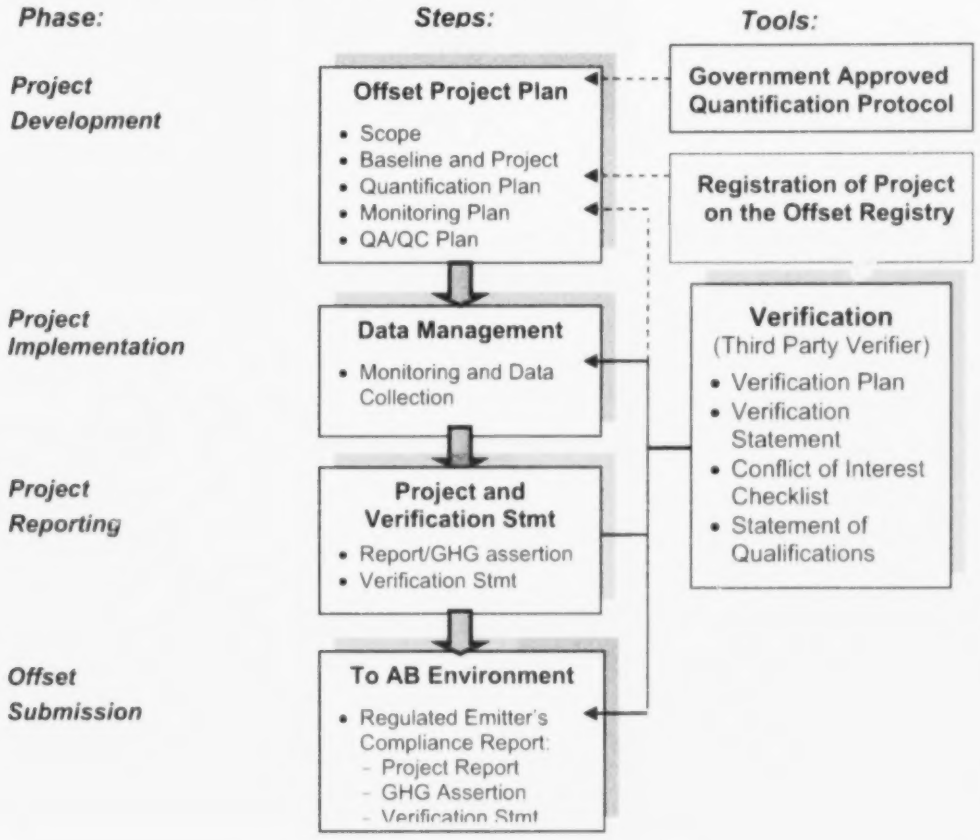
- **Environmental Benefits**: the design must ensure project-based emission offsets result in further reductions and removals in greenhouse gas emissions, than would be the case if offset credits were not available. Other environmental benefits can be addressed when considering project eligibility.
- **Transparency and Accountability:** to earn public confidence and mitigate conflicts of interest, the offset system must maximize opportunities for public scrutiny and input at the level of individual projects; and ensure robust, independent verification of emission reductions and/or removal enhancements while respecting confidential business information.

The Alberta Offset System (see Figure 2) is designed to function in a timely and cost effective manner while ensuring quality projects are developed and credible reductions/removals are verified. The system recognizes the need to balance environmental integrity with the ability to commercialize market opportunities.

The Alberta government believes that minimizing the administrative cost burden of the offset cycle is key to allowing business to find efficient and effective solutions to reducing GHGs through the Alberta offset market. In this context, the Alberta Offset System does not follow the full project cycle, common to other systems[11]. The Alberta system relies on *ex poste verification*. This means that the emission offsets are first created, and then verified. In other systems, a mandated validation step sometimes occurs in the cycle, where an authority reviews a project application document. In these systems, the authority assesses whether the project fits the eligibility of the system at hand and is legitimately going to result in the proposed tonnes of offsets stated in the application.

[11] Examples include the Clean Development Mechanism (CDM) or Joint Implementation (JI) processes.

Figure 2. The Alberta Offset System at a Glance



Under the Alberta system, validation is optional. This service will be provided by third party agents where there is a demand. This was decided, in part, because of the need to have an efficient system, without undue administrative burden for project developers. The Alberta government's position is that validation is essentially a business risk management tool, and can be contracted with the private sector to perform this task. For more information on verification and validation, see Box 1.

Box 1. Validation and Verification

Validation occurs before the project begins (ex ante) and focuses on:

- *Whether appropriate baseline and project conditions are used;*
- *Whether the calculations of **potential** offsets are correct;*

Validation occurs once and requires technical expertise in the Project area.

Verification occurs during and after a project (ex poste), and focuses on:

- *Whether the calculations of **actual** offsets are correct;*
- *Data integrity and consistency with Project Plan;*
- *Whether data is complete and accurate and conforms to verification criteria;*

Verification requires less technical knowledge and more data assurance expertise.

2.3 Tools for the Offset System

2.3.1 Quantification Protocols

A number of government-approved quantification protocols have been developed to support the Alberta Offset System. These protocols have been developed using the best available science for Alberta, good practice guidance, provincial/national expertise and experience gained through similar international projects. These protocols should be useful to project developers who want to get started immediately, and also serve as guidance for those who want to develop quantification approaches unique to their circumstances in the future.

The availability of a quantification protocol is expected to decrease development costs and reduce risk for buyer and seller when implementing projects. The protocols provide a strong framework to base the Offset Project Plan, with accompanying Quantification, Monitoring and QA/QC sub-plans. In addition, the verification process will be more efficient if the Verifier Company can reference an Alberta Offset Quantification Protocol applied to a specific Project.
Over the short term, the Alberta Government believes the focus of the offset market should be on learning the system and ensure maximum transparency as project developers begin to create credits and trade this new commodity. For this reason, the use of government approved quantification protocols will provide the credibility needed in the early days of the market. Later on, the Government will be developing a process to guide those project developers who want to develop their own activity or project-specific methodology for submission to the Government for approval. A template, evaluation tool and requirements for expert engagement are under development.

2.3.2 The Role of the Registry

The Alberta government is taking the market needs of project developers and regulated emitters into account and is in the process of establishing a public Alberta Offset Registry for Alberta-based projects. The Registry is a public forum (i.e. website) that provides details on carbon offset projects through accompanying documentation. The registry does not provide assurance about the validity of a carbon offset – this is done through third party verification. However, posting on the public registry allows for greater transparency for the system, and serves as a 'meeting place' for buyers and sellers to facilitate bilateral agreements. Trading will occur offline to the Registry.

Verified offset tonnes used for compliance in the Alberta regulatory system must be registered. Project documentation should be posted on the website to ensure transparency and accountability. The Government does not mandate when the project needs to be registered - this can occur at any point in the development of the project. However, when offset tonnes are used in a compliance report, they will need to be registered with the registry and serialized.

The Alberta government believes that by allowing the private sector to service project developers in the validation/registration process, the overall efficiency of the system improves, and the administration becomes simpler and less time consuming.

2.3.3 Assurance Services and the Value of Validating Projects

There are a number of assurance services that may be offered by the private sector in support of the offset market:

- Validation - an assurance service that examines the potential of a project to legitimately result in the stated GHG emission reduction or removal enhancements according to the rules of the offset system. It is a forward looking analysis.

The ex-poste verification design of the Alberta Offset System has stimulated market interest in validation services to minimize risk and provide some assurance that projects will have value up front. Project Developers are currently seeking validation services in the following areas:

1. Pre-validation services – hiring qualified companies to assess the potential for a project or multi-linked projects for the purposes of establishing general commercial value, assessing the technical complexity of the project and/or to garner investor interest;
2. Flexibility provision services – hiring qualified companies to assess whether the flexibility provision allowed by government-approved protocols were done based on best available science and/or meet specific project circumstances;
3. Project validation – hiring qualified companies to assess if the Offset Project Plan developed for the Project was done completely and accurately;
4. Protocol/methodology validation – hiring qualified companies to provide assurance that private sector-based protocols have been developed in accordance with good practice guidance using best-available, consensus-based science; have proper technical review; and are ready for submission to the Alberta government for standardized review and approval.

- Pre-Verification Check - an assurance service that examines the readiness of a project for verification based on historic and forward looking analysis. It does not result in an assurance statement.

2.3.4 Project Development

To enhance data management and coordination and help reduce time and costs, an Offset Project Plan must be developed for a project. The Offset Project Plan includes a description of the baseline and project condition, and explicit sub-plans for quantification, monitoring and QA/QC procedures. A verifier will eventually need this information to verify project emissions records.

Additional policy and regulatory approvals may be required to begin a project (water licensing, environmental permits and approvals, and/or EUB/NRCB approvals). The verifier will be assessing whether these processes were undertaken.

Resources like this series of Guidance Documents, the government approved quantification protocols, and other knowledgeable service providers should be consulted.

2.3.5 Project Implementation

The Quantification, Monitoring and QA/QC sub-plans all determine what data management system is necessary for recording project information.

There is no single data management system that applies to all projects. For example, a technology-based project like an anaerobic digester would need a different data management system than an activity-based project such as reduced tillage. The nature and types of data will differ. In most cases, the data management system for the GHG data from offset projects has a mix of manual and automated aspects. The data management system extends from measurement to reporting and must be documented. Assurance practitioners like accounting and engineering firms provide verification services, and can assist in the development of the system.

The use of an Alberta government-approved protocol assists in the development of the data management system since the Alberta protocols provide the project developer with the kinds of data to be collected, how often, and through what means. Again, this reduces the time and complexity of verification, and can form the basis of a verification plan.

2.3.6 Project Reporting

In order to generate an emission offsets for use by a regulated emitter, the project developer will have to prepare the necessary documentation. This will include preparing a Reductions/Removals or Project Report. This report must provide documentation and evidence for project operations that give rise to the reduction or removals achieved. The timing of the report is usually outlined in the Verification Plan, and is developed cooperatively with the Project Developer and a third party verifier.

The Project Report must include:

1. Project details and information, demonstrating that the activities and procedures outlined in the Offset Project Plan or Approved Quantification Protocol were followed and, in the case of the latter, how they were applied to the Project;
2. The time period covered by the Report (the Reporting Period);
3. Project details on any changes to the project that arose during the Reporting Period (see below);
4. How the GHG reductions or removals (in tonnes CO_2e) were calculated, including clearly identifying all inputs, emission factors, equations and methods;
5. Reduction/removals totals (including for each separate GHG); totals should be clearly identifiable;
6. Signatures of all Project Developers listed in the Offset Project Plan; and
7. An appended Offset Project Plan.

It's vital that details on any changes to the project like modifications in calculation procedures, data collection and/or record keeping procedures, emissions factors or other variables and any changes to the legal requirements of the project be included. This will be important for the verification process. The Verifier will be auditing against the initial Offset Project Plan or Quantification Protocol to see if any material discrepancy occurs, so if changes to the calculations or data collection procedures aren't included in the Project Report, the Verification Report may not reflect current project conditions. Supporting raw data should be retained by the Project Developer for at least 7 years after the end of the Reporting Period.

At the time of Project Verification, the Project Developer will have calculated the number of offset tonnes achieved and compiled this in the Report - this is known as a ***GHG Assertion.*** The verifier will then conduct an independent, systematic review that objectively obtains and evaluates evidence regarding the GHG assertion. The focus of this review is to determine the degree of correspondence between the assertions and established verification criteria, and then communicating the results back to the project developer[12].

Most verifiers will also issue a management letter to the project proponent. These are observations that were made during the course of the review that are not material to the GHG assertion but could improve the efficiencies and effectiveness of the project's GHG data management system and data controls. The information is confidential and does not get submitted to Alberta Environment.

2.3.7 Offset Submission

Once the Project Report and Verification Statement are complete, the GHG Assertion, Project Report and Verification Statement are interlinked and cannot be separated[13]. They are submitted together to Alberta Environment along with the regulated emitter's Compliance Report to satisfy the emitter's compliance requirements.

The statement of verification is typically one page and is similar for all emission offsets with only the details of what is being assured changing

2.4 Roles and Responsibilities

There are three parties involved in the Offset Cycle: the Project Developer (accountable party), the Alberta government (user), and the external verifier (objective, knowledgeable assurance practitioner). The Buyer should provide an additional check and balance to the system by ensuring due diligence on the project developer.

This relationship exists because of a GHG assertion made by the Project Developer. More information on declaring a GHG assertion is in Section 2.5.8 of this Guide.

[12] Adapted from the American Accounting Association Committee on Basic Auditing Concepts (1971)
[13] Specific offset credit project information required for inclusion will be identified in the regulation compliance report

Between each of these parties is a functional relationship described in Figure 3.

Figure 3: Parties Involved in the Offset Cycle and Verification.

The nature of the relationships between the:

- Project Developer/Buyer and government is one of *accountability*. The Project Developer is accountable to the government to provide good reliable information. The Regulated Emitter's/Buyer's role is to ensure due diligence on the responsibilities of the Project Developer.
- Verifier and the Project Developer is one of *objectivity*. The verifier must be objective from the Project Developer. Objectivity is difficult to measure, so independence is typically used as a surrogate measure.
- government and the Verifier is one of *opinion*. The verifier will provide an opinion to the government about the Project Developer's GHG assertion.

As a consequence of the relationships, each party has responsibilities discussed in Table 1. The main responsibility of the Project Developer is to prepare the GHG assertion, to develop and maintain the data management systems, and associated controls that generate the GHG assertion. The main responsibility of the government is to set the verification criteria (rules of the system, quantification protocols), and communicating acceptable levels of assurance and materiality. The main responsibility of the verifier is to maintain independence from the project developer, conduct the verification in accordance to standards, and maintain confidentiality.

Table 1: Roles and Responsibilities

Role	**Responsibilities***
Project Developer (accountable party)	GHG assertion GHG data management systems and controls Project Report

Government (user)	Verification criteria Level of assurance and materiality Receipt of Compliance Reports
Verifier (assurer)	Independence Verification Confidentiality

*The Buyer's role is one of due diligence on the responsibilities of the project developer.

2.5 Fundamentals of Offset-based Projects

This section outlines fundamental components of offset projects in Alberta. It is intended to provide a basic level of knowledge for the Project Developer regarding what projects may be eligible to generate offsets under the Alberta Offset System, and what steps are necessary to go from project conception to offset submission in the Alberta Offsets Registry.

The Alberta Offset System is structured such that *relative* emissions are quantified. The fundamental concept guiding the calculation of a GHG reduction involves the comparison of GHG emissions under one scenario (the Project Condition) with GHG emissions under another functionally equivalent scenario (the Baseline Condition). Both Project and Baseline Conditions are described in detail in the sections below, along with the concept of equivalent function.

2.5.1 Project Condition

The project condition is a specific action or intervention targeted at changing GHG emissions by reduction, removal or storage. This may consist of a single activity or several related activities. The project condition may include modification of existing production, process, consumption, service, delivery or management systems, or introduction of new systems.

There are two important components that describe the project condition:

- **Project Scope:** the project scope should clearly identify which activities are included/excluded for the purposes of quantification of GHG reductions, and must allow for clear understanding of the function of the project and all of the relevant components. This involves identifying all GHG sources and sinks associated with the project from inception to decommissioning, and identifying the activities that will be quantified; and

- **Project Site Definition:** the project site should be defined based on the characteristics of the individual project. In some cases, the project site may extend beyond the physical or geographical boundaries of the project's infrastructure, or may be a smaller portion of a larger physical site boundary. In general, the project site will consist of all GHG sources and sinks that are directly controlled by the project itself. Sources and sinks that are either related to the project or affected by it will be located upstream or downstream of the project site.

The project scope and project site are broadly defined for each project type in the associated quantification protocol. The details of the project conditions are generally communicated in the Project Plan.

2.5.2 Baseline Condition

GHG reductions achieved by a project are measured relative to the emissions that would have been generated had the project not occurred – that is, relative to the baseline condition. The baseline condition is a reasonable representation of conditions that would likely have occurred during the offsets credit period in the absence of the proposed project. In other words, the baseline represents "business as usual" and the project represents a change from this practice.

There may be several possible baselines that are relevant to a particular project. In order to effectively describe the baseline condition, the Project Developer must select an appropriate baseline type and provide justification for the selection. The baseline types that may include:

- **Historic Benchmark:** is typically site-specific and can be constructed to reflect activities in a specified base period. An historic benchmark baseline assumes that past trends will continue into the future. For example, a project quantifying emission reductions due to changes in nitrogen fertilizer application may use the rate of nitrogen fertilizer application at the project farm averaged over the previous three years as the baseline;

- **Performance Standard:** uses an assessment of comparable activities within a given industry or sector. It assumes that the typical emissions profile for an industry or sector is a reasonable approximation of the baseline scenario. For example, the typical enteric emissions per head of cattle in a feedlot may be used as a baseline for a project that quantifies emissions reductions due to changes in cattle feeding practices;

- **Comparison Approach:** uses actual measurements of parameters from a control group to compare with the project. Emissions or removals from the control group are monitored throughout the project and compared with the emissions from the project site. A control group may be used as the baseline for more than one project.

- **Projection Based:** uses projections of reductions or removals in the future as a comparison for the project condition. Projections may include straight-line growth assumptions or more complex modeling, and may be based on a set of constant parameters or may be varied over time according to pre-defined procedures.

- **Adjusted Baseline:** takes into account current practice levels of a particular project and specifies that the same baseline is used for all projects of a certain type, regardless of historical practices. An adjusted baseline would normally be specified by the Alberta government for project types where current practice levels are well documented. For example, an adjusted baseline has been established for no-till and reduced-till projects. In this case, the adjusted baseline is to be applied to all tillage management projects to account for the existing level of the various practices. The adjustments are based on the agricultural practise census completed by Statistics Canada every 5 years.

Under the Alberta Offset System, the baseline condition chosen for a particular project is valid until the end of the 8-year credit duration period, with a possible 5-year extension from the project start date (specific exceptions are outlined in Section 2.7.2).

The baseline types above may be either static or dynamic over the credit duration period:

- **Static**: the emissions profile for the baseline activity does not change during the credit duration period. Both the input parameters for baseline calculations and the quantification methodology remain constant.

- **Dynamic**: the quantification methodology does not change over the credit duration period, but the input parameters may change due to a number of factors including weather conditions, project operational parameters, etc. Thus the emissions profile may change with time under a dynamic baseline condition.

It is important to note that protocols using dynamic baselines may be affected by many factors, including changes in regulatory frameworks, published emissions factors, or market activity. For example, for a composting project generating emission reductions under a dynamic baseline, parameters such as mass of material processed during the project would need to be evaluated. However, the baseline condition would not be impacted by the voluntary installation of a landfill gas collection system at the landfill from which the material is being diverted. Regulatory influences such as mandated landfill gas recovery would continue to impact the baseline.

The relevant baseline conditions will have been evaluated and the most appropriate baseline selected as part of the quantification protocol development process. The quantification protocols will also specify if the baseline is static or dynamic. Any relevant site-specific details for the baseline conditions would then be identified by the Project Developer in the Offset Project Plan.

2.5.3 Equivalent Function

The calculation of GHG reductions under the Alberta Offset System requires comparison of relative emissions between a Project and a Baseline condition. In order for this comparison to be meaningful, the Project and the Baseline should provide the same function and quality of products or services. For example, if a project is designed to reduce emissions by recovering waste heat from an industrial process, the emission reductions should be compared to an equivalent level of heat generation under the baseline condition (e.g. the number of kilowatt hours of energy required to produce the heat). This type of comparison requires a common metric or unit of measurement such as the mass of beef produced, land area cropped, etc. for comparison between the project and baseline activity.

It is important to note that equivalent function can be demonstrated in different ways for different components of a project. In other words, the common metric must be the same for the comparable baseline and project sources/sinks, but different common metrics may be used for different sets of comparable sources/sinks. It is also important to note that several common

metrics may indicate equivalent function between the project and baseline sources/sinks even though the sources/sinks are not in fact functionally equivalent.

For example, consider a biofuels project where the volumes of fuel produced under the project (e.g. ethanol) and baseline (e.g. gasoline) appear to be functionally equivalent by volume, but are not an equivalent energy basis. To be functionally equivalent, the common metric would be to calculate the energy content of each fuel and report on that basis (energy content/litre of fuel).

2.5.4 Quantification Plan

The Quantification Plan forms a portion of the Offset Project Plan and should be developed by following an appropriate Quantification Protocol. Where a Quantification Protocol describes in general terms the methodology for quantifying GHG emissions from a particular type of project, the Quantification Plan provides project-specific details on the implementation of the Quantification Protocol.

The Quantification Plan should include:

- A description of the key sources and sinks to be quantified;
- A full list of parameters required for quantification indicating which parameters will be measured and which will be estimated;
- A description of the measurement and estimation procedures for each parameter;
- Supporting information to justify the measurement and/or estimation procedures (i.e. references for emissions factors, measurement equipment specifications); and,
- Information on the data quality management procedures to be used.

2.5.5 Data Flow

In a project, GHG data flows throughout the organization from measurement point to reporting. It is this data trail and the controls around the data that verifiers are concerned with. Documentation and monitoring of this data flow and the associated data management system and controls is critical for the verification process. It will be used to verify accuracy and completeness of the emissions reduction plan and subsequent, GHG offsets credits.

2.5.6 Monitoring Plan, including QA/QC

The Monitoring Plan also forms part of the Offset Project Plan. The Monitoring Plan provides the linkage between the Offset Project Plan and the data management system by connecting the measured parameters required for calculating the emission reduction or removal enhancement to the input data entered into the data management system.

The Monitoring Plan provides an even greater level of detail than the Quantification Plan, and describes exactly how measurement will be carried out. This may include specifications of monitoring equipment to be used, locations of sampling points, frequency of sampling events, data collection methodology, and other details. Most of this information is provided in the Quantification Protocol's approved under the Alberta system.

There are different levels of accuracy associated with different measurements. The more accurate the data measurement, the better; however, this must take into consideration costs and other practicalities of measurement. Measurements can be categorized as follows where tier 5 is the most accurate and tier 1, the least accurate:

Table 2: Emissions factor calculations and associated levels of accuracy

Five tiers for GHG information types or sources[14]	
Tier	*GHG information type or source*
Tier 5	Continuous direct measurement
Tier 4	Site-specific correlations
Tier 3	Intermittent (periodic) direct measurement
Tier 2	Use of models
Tier 1	Use of default emissions factors

2.5.7 Data Management System and Data Controls

Monitoring is the start of the data flow process. A Project Developer can institute a data management system that connects the measured parameters to the reported values. There are a wide variety of data management systems and no one system that is suitable for all projects. Data management systems can be manual, partly manual/automated, and fully automated. Manual refers to the data procedures being performed by personnel. Automated refers to the data procedures being performed by a computerized system. The more automated the system, the more robust it tends to be as long as it has been tested. In most cases, the data management system for the GHG data of offset projects is a mix of manual and automated. The data management system extends from measurement to reporting and needs to be documented.

Data controls are procedures conducted to ensure that the data is complete, accurate, and valid and not subject to corruption. They are integral to the data management system, but also are superimposed on the system, and have one or more of the following objectives:

[14] Quantification protocols will be based on and reflect that most appropriate Tier. Flexibility may be offered in some protocols to encourage enhanced accuracy.

- Completeness – ensuring the data is complete according to the Offset Project Plan or Quantification Protocol;
- Accuracy - ensuring the data has been calculated appropriately and the measurements reflect the correct values
- Validity - making sure no erroneous information is introduced into the data.
- Restricted access - addresses the security of the data management system.

Controls exist throughout the data management system but are of significance whenever there is a transfer or change of data or information. Examples of data controls include passwords on computers, read access requirements on files, reasonability limits on inputs, record length checks on file transfers, approvals and testing procedures for algorithm changes, distribution lists for reports, and management review of reports.

The data management system and data controls are important to the GHG information management because they assist in ensuring that the data is complete and accurate and is not subject to deliberate or unintentional corruption. Additionally, robust and documented data management systems and controls allow for a more efficient and cost-effective verification of the project.

2.5.8 Declaring a GHG Assertion

Declaring a GHG assertion is the method in which the volume of GHG reductions achieved by the project is communicated to all of the parties involved in the Offset Cycle and Verification. The GHG assertion is a statement of the number of offset tonnes achieved during the reporting period, typically, the span of a calendar year or years. The assertion should split out each of the individual GHG's (CO_2, CH_4, N_2O, SF_6, HFCs, and perfluorocarbons) considered for national greenhouse gas emissions inventory reporting purposes. The total in units of tonnes of carbon dioxide equivalent (CO_{2E}) calculated using the global warming potentials referenced in Alberta's *Specified Gas Emitters Regulation* must be included.

The GHG assertion is normally issued as a draft, which is then updated based on the results of third-party verification. The assertion becomes part of the Project Report and is submitted, along with the Verification Statement, to the regulated emitter when a transaction occurs. The Project Report (or specific information contained in the report), the GHG assertion and the verification report are submitted to Alberta Environment by the regulated emitter as part of the compliance reporting process. A sample GHG assertion is provided in Appendix 1.

2.6 Tools for Developing an Approach

2.6.1 Offset Project Plan

The Offset Project Plan is a document laying out the details of the project in terms of GHG reductions/removals. It is an essential tool to communicate the details of the project to the

Verifier during the verification process. It is also an essential tool for demonstrating to investors that the project can achieve stated GHG reductions.

The following elements must be contained in the Offset Project Plan:

- Project scope
- Project site definition
- Inventory of sources and sinks
- Identification and justification of baseline
- Quantification plan
- Monitoring plan
- QA/QC Plan

2.6.2 Good Practice Guidance

Good practice guidance is defined as "recognized criteria, methodologies, tools and guidance". In the context of the Alberta Offset System, good practice guidance refers to available information on the accurate quantification of GHG emissions and the reductions associated with project-based offsets. Good practice guidance can aid the project proponent in providing a justification or rationale for decisions made at any stage of the project, including the identification of relevant sources and sinks, justification for exclusion or inclusion of relevant sources and sinks, quantification of emissions, and determination of how the emissions may change under the project conditions.

Good practice guidance may also be used to aid in project planning, measuring, monitoring and data management, as well as assessing baselines and equivalent functions. Some sources of good practice guidance are listed below. This list is not exhaustive, and Project Developers are encouraged to research other good practice guidance sources:

- **Clean Development Mechanism (CDM)** – the CDM provides useful information on project-level quantification, and methodologies that have been reviewed by an international group of technical experts. http://cdm.unfcc.int/methodologies

- **World Resources Institute (WRI)/ World Business Council for Sustainable Development (WBCSD) GHG Protocol for Project Accounting** – provides a set of requirements and guidance for GHG project-level accounting, including examples. The document has also undergone international review. www.ghgprotocol.org

- **The Intergovernmental Panel on Climate Change (IPCC) Programme for National Greenhouse Gas Inventories** – provides a reference manual, workbook and good practice guidance for calculating and compiling country-level GHG inventories. The IPCC document was used by the Government of Canada to construct its National GHG Inventories. www.ipcc-nggip.iges.org

- **The National Inventory Report: Environment Canada:** Greenhouse Gas Sources and Sinks in Canada – provides the most recent statistical information about GHG emissions in Canada, as well as emissions factors for several industries. http://www.ec.gc.ca

2.6.3 Flexibility Mechanisms

Flexibility mechanisms have been built into the Alberta quantification protocols. These mechanisms allow project developers to utilize a specific quantification protocol even when the protocol's project and baseline conditions or other select protocol components are not an exact match for the project developer's situation. The flexibility mechanisms vary between quantification protocols, but generally include the ability to use site-specific emission factors instead of default factors and the ability to add or remove sources and sinks based on their applicability. In all cases, the following approach will be taken to incorporate custom coefficients:

1. Government Approved Protocols Only
    - All credits used for compliance must be verified using Alberta Government approved protocols.
    - This includes new protocols and any already approved protocols where **custom coefficients** are being considered.

2. Rigorous Scientific Foundation
    - All protocols will be based on best-available science.
    - Adjustments will be made as appropriate to ensure credits reflect **beyond business as usual** reductions.
    - Guidance on developing new coefficients/protocols can be found on http://environment.alberta.ca/1238.html.

3. Retroactive Crediting
    - Where custom coefficients have been demonstrated to reflect sound science and have incorporated the appropriate adjustments:
        i. The **new coefficients will be made publicly available** as a revised Alberta government approved protocol.
        ii. All applicable, projects are eligible to receive credit for the difference in associated reductions between the originally approved and new quantification protocol **back to 2002.**

2.7 Special Considerations

2.7.1 Project Start Date

As mentioned in Section 1.0, the intent of the *Specified Gas Emitters Regulation* was to ensure that the projects generating emission reductions are additional to what otherwise would have occurred in Alberta. As such, projects must have an effective start date on or after January 1,

2002. The start date is considered to be the first day of operation of the facility or project. Table 3 summarizes the effective start date for a number of the project types for which there are currently approved Alberta protocols. This is intended to provide specific clarity for these projects as well as guide developers of other projects in justifying an effective start date.

Table 3: List of effective start dates for select offsets projects

Protocol	Project Start Date
Energy Efficiency	Date equipment installation, operating parameter changes or process reconfiguration are initiated or have effect.
Waste Heat Recovery	Date waste heat recovery system takes effect.
Enhanced Oil Recovery	Date of initiation for commercial injection, which may be subsequent to a testing phase.
Beef Feeding	Date the new feeding regime is implemented.
Beef Lifecycle	Date the first set of animals is received at the feeding facility that will be completing the final lifecycle phase.
Pork Production	Date of the actions which indicate that the manure management system has changed and/or date the new feeding regime is implemented.
Tillage Management	Not applicable for the default protocol as it applies an adjusted baseline approach.
Landfill Gas Recovery	Date the first landfill gas is combusted under controlled conditions.
Aerobic Composting	Date first batch of feedstock is received at the site that is not for a testing phase.
Anaerobic Digestion of Agricultural Materials	Date first batch of feedstock is received at the site that is not for a testing phase.
Energy from Biomass	Date first batch of feedstock is received at the site that is not for a testing phase.
Biofuels	Date first batch of feedstock is received at the site that is not for a testing phase.
Afforestation	Date of planting of first seedlings.
New Protocol 1	[Date]
New Protocol 2	[Date]

2.7.2 Credit Duration Period

The credit duration period has been set at 8 years. This is the period through which the project may quantify the emissions under their baseline operating condition. This consecutive 8-year period is based on the start date of the first emission reductions being claimed as an offset.

Following this period, projects may be eligible to generate credits for an additional 5 years; however, at that time, projects would be required to adhere to the most current version of the applicable quantification protocol.

Note that in some situations, an approved protocol may no longer exist and the activity is considered 'business as usual'. The project would not be eligible for additional credits in these situations.

The credit duration period has been adjusted based on special considerations for the following two project types:

- Forestry Projects – credit duration period is set as 60 years, or 3 twenty year cycles of planting/harvests before an afforestation project is deemed reforestation, due to the slow project offset generation cycle times..
- Tillage Management Projects – credit duration period is set as 20 years due to the adjusted baseline approach.

For these project types, the protocol of the day will be adopted every 10 years, and used for credit quantification over that associated period. If an approved protocol no longer exists at the end of any 10-year period, the last approved protocol will be used for the remainder of the credit duration period.

2.7.3 Electricity Displacement Factor

The mix of electricity sources on Alberta's grid is comprised predominantly of coal, with smaller, but growing sources of natural gas, biomass, wind, hydro, and other alternate and renewable sources. Calculating offsets credits must recognize and incorporate the different GHG intensities associated with these sources.

Several of the approved quantification protocols require an electricity displacement factor to determine the appropriate baseline emission rate[15]. This factor is used to quantify the indirect GHG reductions from project-generated renewable electricity and improvements in energy efficiency. This factor has been set at:

0.65 tonnes of CO_2e/MWh

The factor was developed using available best practice guidance from the World Resource Institute (WRI) and the Clean Development Mechanism (CDM) for calculating applicable, regional grid intensity factors[16]. Both methods rely on a weighting of emission factors

[15] Renewable electricity projects create offsets as a portion of the net quantity of electricity exported to the grid (net of any Renewable Energy Certificates or parasitic load measured at the point of delivery) compared with the quantity of electricity that would otherwise have been generated by other sources on the grid in the baseline condition including coal and natural gas

[16] WRI - http://pdf.wri.org/GHGProtocol-Electricity.pdf
CDM - http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

representing the time-weighted marginal electricity production and the overall electricity capacity for the region

The Alberta factor above is based on an average intensity for the operating margin, grid GHG intensity, and the build margin for new generation. It will apply for a period of 5 years, after which time, the build margin and grid intensity numbers will be recalculated and the electricity displacement factor revised using the same methodology. These new factors will be valid beginning the year it is published.

2.7.4 Project Accounting and Corporate Investment

The Alberta Offset System is a market-based approach designed to stimulate innovation and find reduction opportunities in the private sector. The intent of the overall system is to encourage investment in project-based offsets by creating a demand for offsets. The Alberta government recognizes that corporate investment in project-based offsets may require the acceptance of some risk by the investor. However, it is anticipated that the risk will be limited by the implementation of an 8-year credit duration period with a possible 5-year extension to allow for economic analysis of potential projects over the long term.

Another method of limiting investor risk is the aggregation of offsets generated by several different projects, to create a more powerful marketing position, reducing costs and managing risk more effectively. Aggregated projects are more common in sectors where many players contribute modest amounts of tonnes through any given project, such as agriculture, or consumer-based initiatives.

2.7.5 Linkage to GHG National Inventory

Many of the calculations included in the quantification of GHG reductions have an inherent uncertainty because parameters may be estimated or difficult to measure accurately. In addition, some of the emissions factors used in the calculations are based on industry or sector-wide statistics and may not accurately reflect conditions at the project site. Developing site-specific emission factors is a method of increasing accuracy; however, the uncertainty associated with site-specific emissions factors could be high. Quantifying uncertainty in GHG reduction quantification is challenging and may be beyond the resources of the project developer.

The Alberta Offset System provides several ways of managing the inherent uncertainty in the quantification of GHG reductions:

- **Use of accepted Quantification Protocols**: the quantification protocols provided by the Alberta government have been developed following internationally approved methodologies, have undergone extensive technical and stakeholder review, and are specific to Alberta. As such, the Alberta government is prepared to accept the levels of uncertainty associated with these protocols and will not require the project developer to quantify the uncertainty independently;

- **Use of the National Inventory**: the GHG National Inventory provides Canadian and provincial statistics, and industry-specific emissions factors. The uncertainty of the data in the National Inventory is discussed in the report. The Alberta government is prepared, where factors and protocols are used appropriately, to accept the level of uncertainty associated with the use of data in the National Inventory and as such, the project developer will not be required to quantify the uncertainty independently; and

- **Use of Good Practice Guidance**: the use of good practice guidance is an important method of limiting uncertainty when accepted quantification protocols or National Inventory data are not available. For example, use of IPCC methodologies to calculate site-specific emission factors can limit uncertainty and lower the requirement for justification of the calculations.

2.7.6 Assurance Factor Implementation

Biological sink projects have a number of risk factors, which provide the opportunity for the reversal of the greenhouse gas emission benefits from these activities. Traditionally, the permanency issues associated with these projects (i.e. tillage management and afforestation) have been addressed by treating the emission offsets as temporary. This would establish two-tiers of offsets, create a number of challenges for offset system operation, and creates an additional market for temporary offsets. In effect, temporary credits provide the opportunity to defer a compliance obligation, and are treated as though the reversal is inevitable and equivalent in magnitude to the sequestration achieved.

For the tillage management and afforestation protocols under the Alberta Offset System, the risk of reversal has been assessed through consultation with industry and government experts. Based on the results of this consultation, an assurance factor approach was adopted. Under this approach, assurance factors are established across each of the relevant protocols to reasonably discount the volume of offsets achieved by projects in any one year to the volume that would be considered permanent. Although this represents a decrease in the volume of offsets achieved in any given year, the liability for reversal is transferred from the project developer to the Government of Alberta. Further. Offsets achieved are valued as permanent offsets, rather than temporary credits, which would have only a nominal value.

On-going monitoring of the efficacy of the assurance factors will be completed to ensure that the risk is properly managed and environmental integrity is maintained. As such, the assurance factors may be adjusted over time for new projects.

3.0 RISKS FOR OFFSET CREDIT TRANSACTIONS

Ownership

Buyers need to ensure that any potential offsets or any verified emission reductions they contract for are definitively owned by the seller. Other potential claimants include other project participants, the landlord or landowner, and the technology provider. It is important for both the buyer and seller to ensure potential claimants are identified and the risk is managed appropriately. The buyer can do this through a due diligence process and in contracting. The seller can do this through contracting, generally with other claimants or in funding agreements (if applicable).

Delivery

Many of the large emitters that will need to buy offsets are large companies with established credit ratings. Almost all of these buyers will have minimum security requirements for doing business. These requirements will be required to address the liability of the large emitter that will only receive confirmation of the validity of the offsets upon submission of their annual compliance reports and all associated offsets transaction receipts, which are submitted to Alberta Environment for compliance purposes. These requirements will also address the contracting for forward streams of offsets. As many sellers are small, unrated, and unable to offer the security buyers are seeking, alternative arrangements to address this risk may be required.

Policy

The implementation of the Alberta Offset System is providing some of the necessary policy clarity to support the offset market. Given the infancy of the system, there is some learning that can only be accomplished by experience. Clarification on policy and guidance on procedural elements, such as precedents with respect to ownership, will facilitate the long-term success of the Alberta Offset System.

The development of a federal offset system under a separate policy direction creates uncertainty. There is the risk that as these systems develop and may move towards merging, there may be policy shifts with respect to offset quantification, project eligibility (i.e. project start date), etc.

Government Approval

Project developers are required to have third party verification that the offsets do indeed exist and are quantified correctly. This verification step will be completed by a qualified verifier reducing the risk that offsets are not accepted by the government for compliance purposes. Validation of the project will help mitigate this risk by providing a secondary review of the project in consideration of relevant policies and regulatory guidance.

Intangible Commodity

Emission offsets are intangible commodities that are only made real once verified. As such, there is an additional due-diligence requirement to ensure that the offsets are accounted for properly as they are transferred between buyers and sellers. The use of registries, which provide the opportunity for serialization and tracking offers a means of transparency in the process, but does not negate the requirement for due diligence in the transaction.

Pricing

The emerging marketplace does not yet have an established exchange, only placeholder exchanges. As transactions occur on a bilateral basis, pricing information and contracting terms are rarely revealed. This makes it more challenging for both buyers and sellers to negotiate and to reflect risk in their own pricing.

Further, there is a carbon price 'signal' in the Alberta system provided by the cost for compliance through payments into the Climate Change and Emissions Management Fund. Regulated entities can choose to buy into this fund as means of achieving partial or full compliance with their emissions targets. As such, buyers will likely pay less than $15/tonne (the price currently set for payments into the fund) for offsets given the additional risks they would be assuming.

4.0 Appendix 1. Draft GHG Assertion

NOTICE OF CREATION OF
EMISSION REDUCTION CREDITS

Proponent:

Company Name
Street Address
City, Province Postal Code

Company Contact: *Name and title*
Telephone: *Contact Phone Number*
Fax: *Contact Fax Number*
Email: *Contact Email*

Project Document:

Project Document Title: *Title and version*
Project Document Date: *Date of applicable version.*
Annual Reports: *Title of offset creation annual reports, if applicable.*

Project:

Project Name: *Project name from the project document.*
Project Description: *A brief 1 – 4 paragraph summary of project information.*
Project Location: *A brief description of project location(s).*

Emission Reduction Credits:

ERC Creation Period: *Dates covered by assertion and reporting.*
Emission Type: *Units of measure (typically tonnes of CO_{2E}).*
Quantity: *Quantity of emission reduction offsets being claimed.*

I am a duly authorized corporate officer of the Proponent mentioned above and have personally examined and am familiar with the information submitted in this Assertion Statement, the accompanying Project Document on which it is based. Based upon reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, I hereby warrant that the submitted information is true, accurate and complete to the best of my knowledge and belief, and that all matters affecting the validity of the emission reduction claim or the protocol upon which it is based have been fully disclosed. I understand that any false statement made in the submitted information may result in de-registration of credits and may be punishable as a criminal offence in accordance with provincial or federal statutes.

Signature: _____

Date: _____

Name: _____

Title: _____

5.0 Appendix 2. Glossary

Term	Definition
Aggregated Project	A collection of "projects" that use the same quantification methodology and that have been combined and submitted to the program authority for validation as a single project by an aggregator.
Aggregator	An entity acting as the project proponent for a collection of "projects" that use the same quantification methodology and are submitted to the program authority for validation as a single project.
Anthropogenic	Something caused by human activity.
Avoided GHG Emissions	Reductions/removals, resulting from projects/activities that prevent emissions that would otherwise have occurred, particularly from new sources. Examples include: preventing deforestation or forest fires; and the construction of a state-of the-art energy-efficient buildings.
Baseline	Hypothetical reference case that best represents the conditions (GHG emissions) most likely to have occurred in the absence of a GHG reductions/removals project.
Business as Usual (BAU)	Estimate of an entity's emissions profile under normal operating circumstances.
Carbon Dioxide Equivalent (CO_2e)	A universal standard of measurement against which the impact of different GHGs in the atmosphere can be evaluated. It is calculated using the global warming potential (GWP), which is a measurement of how much heat is retained by the Earth's ecosystem through the addition of a particular gas to the atmosphere. Nitrous oxide (N_2O) and methane (CH_4) are 310 and 21 times more powerful, respectively, than carbon dioxide (CO_2) at trapping heat in the atmosphere.
Carbon Sequestration	The process of storing carbon in a reservoir to prevent its release into the atmosphere.
Carbon Stock	The absolute quantity of carbon held within a reservoir at a specified time (expressed in units of mass).
Controlled GHG Source, Sink or Reservoir	A GHG source, sink or reservoir whose behaviour or operation is under the direction and influence of the project proponent through financial, policy, management or other instruments. A controlled GHG source, sink or reservoir is generally on the project site.
Delivery	The legal transfer and receipt of ownership rights of offset credits following a transaction between parties.
Denitrification	A process, that occurs in the absence of oxygen, where nitrate (NO_3) is converted to nitrous oxide gas, a potent GHG and to dinitrogen gas (N_2).
Direct GHG Reduction	The GHG emissions reduced by a GHG source, sink or reservoir whose behaviour or operation is under the direction and influence of the project proponent.
Due Diligence	The appropriate analysis and research to discover all risks and implications of an action. With respect to emissions trading, due diligence will often include, at a minimum, an examination of ownership claims, potential for achieving emission reductions and creditworthiness of the parties.
Emission or Removal Factor	Factor relating the implementation of an activity, process or event to the emissions/removals of GHG. Often a basis for calculating the actual GHG emissions reduced/removed.

Emission Reductions	Occur when emissions released into the atmosphere by a source are decreased.
Emission Removal	Removals occur when CO_2 or CO_2 equivalents are removed from the atmosphere. This is also known as sequestration. Sequestration occurs when emissions in the atmosphere are trapped in a sink (biological or geological).
Global Warming Potential (GWP)	Each GHG has a different estimated impact on global warming. An index accounts for the potential of each gas to heat the atmosphere, known as the radiative forcing impact over a specified time period (usually 100 years). The GWP translates the impact of one tonne of a GHG emitted now relative to the impact of one tonne of CO2 over the same period.
Greenhouse Gas Reservoir	A physical unit or component of the biosphere, geosphere or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere (i.e., trees, soil, oil and gas reservoirs and oceans).
Indirect GHG Reduction	The GHG emissions reduced by a related or affected source. For instance, a project that reduces the amount of electricity used at a specific location theoretically reduces the amount of emissions created in producing that electricity. The reduction itself does not take place at the specific location; rather it takes place at the sight of electricity generation.
Level of Assurance	The degree of assurance required in a verification statement. The level of assurance is used to determine the depth of detail a verifier designs into their verification to determine if there are any material errors, omissions or misrepresentations. The offset system requires verification be undertaken at a high level of assurance.
Life Cycle Assessment	The examination of the full environmental impact of a product over its entire life cycle—from raw material acquisition to manufacturing, distribution, use and, ultimately, disposal. This toll is used to evaluate the full impact of alternative manufacturing practices and encourage environmentally sensitive design.
Mitigation	A human intervention to reduce emissions or enhance GHG sinks.
National Inventory	A country's total anthropogenic (human-caused) CO_2 equivalent emissions of GHGs during a specified year for the gases and source categories. Environment Canada publishes these reports annually, including significant background information on emission factors.
Project	An activity implemented by a project developer to reduce/remove GHG emissions.
Project Document (Offset Project Plan in Alberta)	A document prepared by a project developer that describes, in sufficient detail, a proposed project. The Offset Project Plan must include a quantification protocol or methodology indicating how the net emission reductions/removals will be quantified.
Project Developer	The person or entity identified in the Offset Project Plan as having the authority to implement the proposed project.
Project Start Date	The date the initial reductions/removals from the project occur. This information must be verifiable.
Quantification Methodology	Provides detailed information on the baseline, monitoring, reporting and quantification of GHG emission reductions/removals for a specific project in the offset system. Differs from a Quantification Protocol in that it is

	applicable only to the project in question, not a generic project type.
Quantification Protocol	Provides detailed information on the baseline, monitoring, reporting and quantification of GHG emission reductions/removals for a project type. To accelerate the verification process, it is expected these standard protocols could be used by different, yet similar projects to eliminate the intricate review process required for personalized project protocols.
Reductions/Removals or Project Report	Report prepared by the project developer quantifying the GHG reductions/removals/reversals achieved during a defined period as specified in the registered project document. The reductions/removals report must include a GHG Assertion.
Registration	Projects will be posted on the Offset System Registry as registered projects.
Reservoir	A physical unit or component of the biosphere, geosphere or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere by a GHG sink or a GHG captured from a GHG source (i.e., trees, soil, oil and gas reservoirs, and oceans).
Reversal	A reduction in the amount of carbon previously stored (sequestered) in a reservoir. This results in increased CO2 emissions.
Sequester	To remove CO_2 emissions from the atmosphere and store them in a biological or geological reservoir.
Sink	Any process, activity or mechanism that removes a GHG from the atmosphere.
Source	Any process or activity that releases a GHG into the atmosphere.
Validation	The process used to determine if a proposed project meets offset system eligibility criteria.
Verification	Process whereby the claimed emission reductions/removals are checked or "audited" to ensure they occurred.
Verification Body	An independent entity, similar to an auditor, qualified to verify a reductions/removals report for specified project types.
Verification Statement	A report prepared by a qualified third party. This report verifies the GHG reductions/removals reported by a project proponent in a Greenhouse Gas Assertion and the supporting reductions/removals report actually occurred.